

REMARKS

The Applicants thank the Examiner for the examination to date and respectfully request reconsideration of the present application in view of the foregoing amendments and the reasons that follow.

The only remaining issue is obviousness.

I. Status of the Claims

Withdrawn claim 65 is amended for a minor editorial change. No new matter is introduced, and claims 57-60 and 62-76 are now pending in this application, with claims 65-74 withdrawn.

II. Claim Rejections – 35 U.S.C. § 103

Claims 57-59 and 75 are rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over US 2003/0224168 (“Mack”) in view of US 6,361,861 (“Gao”). Claim 60 is rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Mack in view of Gao, and further in view of *Carbon*, (39) 2001 505-514 (“Peigney”). Claims 62 and 76 are rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over *Chemical Physics Letters* 358 (2002) 187-191 (“Shang”) in view of Peigney and Gao. Claims 63 and 64 are rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Shang in view of Peigney and Gao, and further in view of Mack. The Applicants respectfully traverse all of these rejections.

Independent claim 57 and its dependent claims

The Applicants maintain the position as set forth in the February 5, 2010 Reply that one of ordinary skill in the art would not have had a reason to combine the teachings of Mack, Gao, and/or Peigney. The Office has acknowledged that Mack is completely silent regarding the recitation in present independent claim 57 that the present nanosheets **are aligned** and **stand on their edges roughly vertically to the substrate**. Office Action, page 4.

Gao's teachings do not remedy Mack's deficiencies. The Office relies on Gao's teachings because Gao discloses carbon nanotubes aligned on a substrate. Contrary to the Office's assertion on page 4 of the Office Action, Gao does not at all disclose "nanosheets," much less nanosheets that "would also be aligned on a substrate." Gao's teachings are directed to carbon nanotubes filled with a conductive filler. At the outset, a carbon *nanotube* is not a carbon *nanosheet*, as recited in present independent claim 57. As explicitly defined in ¶ [0052] of the present Specification as-published, a carbon nanosheet herein refers to "a carbon nanoflake with a thickness of 2 nanometers or less," wherein carbon nanoflakes are "sheet-like forms of graphite..." (bold emphasis added). By contrast, a carbon nanotube, by definition, is a tube with a diameter, which is structurally very different from a sheet or a flake. It can be readily appreciated that a carbon nanotube and carbon nanosheet are different composition matters, with different geometry and distinct physical and mechanical properties arising as a result thereof. Thus, as stated in the February 5, 2010 Reply, even assuming, *arguendo*, that Gao's teachings were combined with Mack's teachings, the nanostructure formed would be carbon nanotubes, not carbon nanosheets, as recited in present independent claim 57.

In addition, Mack's teachings are directed to creating individual layers, which are sonicated to produce nanostructures, as shown in Figure 4 of Gao. By contrast, Gao teachings are directed to simultaneous formation of nanotubes and filling thereof – in other words, the nanotubes of Gao as produced are already filled with a conductive filler at their core. *See e.g.*, Gao, Abstract. A filled nanotube can not undergo the process of Mack (*see* Figure 4) to arrive at the nanostructures of Mack. In other words, a modification based on Gao's teachings would render Mack's teachings unsatisfactory for Mack's intended purpose; thus, there would no suggestion or motivation to combine the teachings of Mack and Gao. MPEP § 2143.01 (V) (stating that if proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification).

Furthermore, the modification based on Gao's teachings would change the principle of operation of the exfoliation and subsequent sonication in the process of Mack (*see* Figure 4), and thus the Office has not established *prima facie* obviousness. MPEP § 2143.01 (VI) (stating that if the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious).

Peigney's teachings do not remedy any of the deficiencies aforescribed. Accordingly, the teachings of Mack, Gao, and Peigney, alone or in combination, do not render obvious present independent claim 57, or its corresponding dependent claims.

Independent claim 62 and its dependent claims

The Applicants maintain the position as set forth in the February 5, 2010 Reply that one of ordinary skill in the art would not have had a reason to combine the teachings of Shang, Peigney Gao, and/or Mack. The Applicants reiterate that Shang teaches away from the presently claimed embodiments by disclosing that the carbon nanoflakes of Shang are **interlaced together** to form a layer of carbon nest-like film (*see* Shang, Abstract). This is in stark contrast to the carbon nanoflakes, as recited in present independent claim 62, in which nanoflakes are **aligned** and **freestanding**, and standing on **their edges roughly vertically to a substrate**, as illustrated in, for example, Figures 29A-29B in the present Specification. Also, as the Office has acknowledged on page 6 of the Office Action, Shang is completely silent regarding the specific surface area of the nanoflake.

The teachings of Peigney, Gao, and/or Mack do not remedy Shang's deficiencies. Peigney is merely a theoretical study of specific surface area of single- and multi-walled carbon **nanotubes** and of carbon nanotube bundles. As explained above, a carbon nanotube, such as that described also in Gao, is **not** analogous to a carbon nanoflake. Thus, the specific surface area of a carbon nanotube, as the Office points to in Peigney's teachings, has **nothing** to do with the specific surface area of a carbon nanoflake, as recited in present independent claim 62. Thus,

even assuming, *arguendo*, that the teachings of Shang, Peigney, and Gao were combined, the embodiment as recited in present independent claim 62 would not have resulted. Specifically, such a combination would still fail to teach the carbon nanoflakes having a specific surface area between 1000 m²/g and 2600 m²/g.

For similar reasons as described in the previous section, Mack's teachings do not remedy any of the deficiencies of Shang, Peigney, and Gao. Accordingly, the teachings of Shang, Peigney, Gao, and Mack, alone or in combination, do not render obvious present independent claim 62, or its corresponding dependent claims.

Therefore, at least in view of the foregoing, the Applicants respectfully request that the rejections be withdrawn.

CONCLUSION

The Applicants believe that the present application is now in condition for allowance and respectfully request favorable reconsideration of the application.

The Office is invited to contact the undersigned by telephone if a telephone interview would advance the prosecution of the present application.

The Office is hereby authorized to charge any additional fees which may be required regarding this application under 37 C.F.R. §§ 1.16-1.17, or credit any overpayment, to Deposit Account No. 19-0741. If any extensions of time are needed for timely acceptance of papers submitted herewith, the Applicants hereby petition for such extension under 37 C.F.R. § 1.136 and authorize payment of any such extensions fees be charged to Deposit Account No. 19-0741.

Respectfully submitted,

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